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## Authentic Social Studies Teaching: The Effect of Semantic Geo-media Material on Learning\*

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### Abstract

The aim of this research is to produce a teaching material (Bilge Seyyah), which can be used in social studies course, and determine its effect on learning. Bilge Seyyah is a geo-media application, which is created with ADDIE instructional design model. The Bilge Seyyah was developed with new technologies such as the latest software languages and web 3.0. The Bilge Seyyah presented the contents of the social studies course to students with authentic learning approach. It decided the authentic - dynamic contents, tasks and maps itself that will be shown to the students. In order to provide this, the geo-media was semantified. Afterwards, the effect of the Bilge Seyyah on learning was tested. For this, quantitative data were obtained with quasi-experimental model. In this context, the control (n=43) and experiment (n=41) groups were randomly determined among the sixth grade students in the fall term of 2015-2016 educational year. To determine the academic achievements and the permanence in learnings of the students in the groups, the "Turks on the Silk Road Unit Academic Achievement Test", developed by the researchers, was applied as pre-and post-test on students in the groups. The attitudes of the students towards social studies course were determined with "Attitude Scale towards Social Studies Lesson" scale. The data gathered from the scales were analysed via the independent groups't-test. The findings indicate that the academic achievements, permanence in learning and attitudes towards social studies course of the students in experimental group were higher than those in control group were. Considering the results of the study, recommendations were given to educators.

### Keywords

Symantic Web, Geo-media, Authentic Learning, Instructional Design, Social Studies Education

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Instructional materials are the environments in which the process of comprehending the achievements appropriate to the students are synthesized and where these syntheses are developed using material preparation and design principles (Yanpar Yelken, 2014). Instructional design is expressed as a system produced for the development of a consistent and reliable education and training programs (Gustafson & Branch, 2002). In other words, instructional design is a structure that expresses consistently and reliably the teaching materials, the lessons and the principles and procedures of the whole system (Molenda & Reigeluth, 2003). The aim of instructional design is to make learning more efficient, effective and easy (Morrison, Ross, Kemp & Kalman, 2011). Therefore, the concepts of material development and instructional design are different from each other. Essentially, the development of course materials is only part of the instructional design process (Şimşek, 2013).

In this frame, the first author of the research developed a teaching material, called the Bilge Seyyah. The Bilge Seyyah can be reached from <http://www.cbsuygulama.com> domain name and broadcasted through the net. The students, who apply the Bilge Seyyah, use the user name and password given to them to access the system. The possible difficulties, which can be encountered related to the system, are being solved with instructions or online help.

The most important feature of Bilge Seyyah is that it takes as a basis the contemporary education concept in teaching social sciences such as history and geography. The Bilge Seyyah can establish the relation of history - man - place in a linear line on cause - result frame. In this context, expert's views were taken from those in the fields of social studies, geography, mathematics and science during planning the Bilge Seyyah. Therefore, the program is multidisciplinary. In designing of Bilge Seyyah, it was benefited from experiences, observations of students and opinions of teachers of social studies.

Bilge Seyyah presents The Unit of Turks in the Silk Road, which is included in the sixth grade social studies curriculum, to the students according to the authentic learning approach. Bilge Seyyah gives scenario based tasks to the students thanks to its semantic structure. Bilge Seyyah also provides clues to students and provides access to information through various data packages so that students can perform their duties. The tasks developed on the map are carried out in the frame of history- place- geography relation. The student, who reaches the information, thus fulfills his duty. Thanks to this relation and the semantic structure of Bilge Seyyah, students can recreate and revive the events in history. However, one of the most significant problems encountered in the field of social studies and specifically in history is undoubtedly the case of impossibility to make experiment. In these tasks enriched by dynamic items, it is a new feature added to the geo-media that a sixth-grade student can revive historical events, embody abstract expressions, and repeat history. All the products (learning) that emerged as a result of the duties of the students are shared with the other students through the system.

During the planning of the Bilge Seyyah, the unit of Turks on the Silk Road was divided into thirteen stages and the database was designed according to each stage. The Bilge Seyyah, that can define the student who enters in the system, decides on the map

to be displayed according to the phase of the students' semantic structure and the content, the relative and the tips to be presented authentically-dynamically. The transition between steps is done with a developed mobile application and takes place in a second. This application is not a production of super computers, animators, computer programmers, where large budgets come together. It is a geo-media application that was made semantic and developed for an experimental doctoral dissertation. The progress of the application was lasted in ten months. The application can be updated and modified. Although the process of producing similar materials takes too long time, it can continuously be developed and applied in this frame. The application does not require a special add-on other than the 3D trip in Bilge Seyyah Turkish and Islamic History Tour, nor does it require much computer knowledge.

### **Theoretical Background**

Science and technology are the basic dynamics of economic and social development; plays a major role in the development and growth of countries (Kaynak, 2011). It is not possible to carry out successful social studies teaching without considering these two factors (Kirman, 1997). In addition, the fundamental improvements stated in information technologies create new opportunities for an effective social studies teaching (Rose & Fernlund, 1997). Effective transfer of topics to learners without deviating from goals and behaviors becomes possible thanks to modern educational technologies (Karabacak & Turan, 2005). In this scope, the importance of science and technology is emphasised in the new social information program implemented in 2005 in our country. The teachers of social studies; thus, are directed to use photos, maps, movies, CD - DVD ROMs, simulations, multimedia items, internet and virtual navigation (Yeşiltaş & Kaymakçı, 2014). These tools and materials enable to teach some abstract subjects and concepts in social studies lessons by being made concrete. (Meydan, 2011). For example, it is very difficult to realise the tectonic stratum movements predicted to be taught in social studies lessons, the moment of the epidemic, the return of time and the moments of decision to the students. In this scope, new technologies come into play, the past can be revived with various communication, and simulation technologies, events can be observed with remotely commanded vehicles (Educause, 2007). One of the new technologies used to realize these is geo-medya.

Geographic information systems based on the compilation, storage, analysis and sharing of geographical data entered in the lives of people quickly. Thus, major commercial companies such as Google, Microsoft, Yahoo!, and Nokia shared their mapping applications with paid and free users over the web. Especially companies such as Microsoft and Google, which determined the direction of technology, combined mapping services with web technologies and brought geographical data to users with the web 1.0 technology in a non-interactive manner. With the introduction of web 2.0 technologies, dynamic content has been added to geographic information systems and maps have become more interactive with different web programming languages. Thus, users could share locations and comment on locations. Even with the strengthening of social media by web 2.0 technology, the popularity of social networks such as Facebook, Instagram, and Twitter has increased. The workload of sharing geographical data from social networks based on the application of geographical information systems

created by web 2.0 technologies. Locations created by determining the coordinates or combining the coordinates have achieved dynamic content. Users began to construct the content of the geographic domain and interfere with the generated content. These developments strengthened the role of geographic information systems in education (Kerski, Demirci & Milson, 2007).

The second important step in the transformation of geographical information systems in terms of web 2.0 technologies was realised with geo-media, which had a different meaning with the integration of multimedia objects into geographical information systems. Geo-media and geographic data were enriched with interactive images, videos and sounds. Geo-media is an abbreviation of geographic media and is defined as the merging or reflection of multimedia objects or products into location-based geographical information (digital-earth.eu Progress Report, 2010). Geo-media uses the spatial location of knowledge and contains different contents (Gryl, Jekel & Donert, 2010). Geo-media is also defined as a new spatial media (Elwood & Leszczynski, 2013). In other words, geo-media is the presentation of geographical information to the users by being supported with multimedia items. With geo-media, users play key roles in the process of organizing space and in social interactions by using mobile devices, web-based mapping applications, and tools such as digital spheres (SPACIT, n.d.). Geo-media products such as spatial mobile devices and online mapping tools are now easily accessible in everyday life (SPACIT, n.d.).

With transferring to v.3.0 in web technologies, web technologies moved to different points and the semantic web came to the forefront. Due to this development, web technology gained a special feature. Thus, the most accurate results are predicted in semantic applications. Web 3.0 technology is reflected to the geographical information in the query or display phase of the geographic data. Thus, geographic data is predicted or reflected. The best example of this is to show and describe the most comfortable, easy and shortcut way to the user according to the traffic and the condition of the road in navigation. In addition, when users share their location information, they use cartographic visualization with geo-media to describe their geographical position and can score the space they are in (Gryl, 2012). With geo-media, users create their own maps and geographic data, specify map features, transfer geographic data, and add multimedia content at the same time (Hennig & Vogler, 2013). Geo-media has a great potential for citizens and organizations in the sense of ecological and spatial awareness (Kanwischer, Burger & Nauss, 2014). With the practical use of the geo-media, all logistical dimensions of a touristic trip can be evaluated (Roosaare, Liiber & Mõisja, 2014). Students can effectively use data collected from geoports prepared in this context in data mining in problem solving and planning tasks in decision making and planning activities (Uuemaa & Liiber, 2014). With geo-media, geographical events and difficulties are understood in detail in terms of sustainability (Miguel Gonzalez, 2012). In addition, geo-media applications are interactive. Geo-media applications include components of spatial games, spatial location, digital world concept, geographic visualization and geographic information systems as well as multimedia (Donert, 2013). Geo-media and geographic information are not related to a single discipline or a single work field. With the increase of geo-media knowledge and consciousness, even

economic revival is expected in Europe (Donert, Parkinson & Lindner-Fally, 2012). Because geo-media technology and method aim at production, consumption and communication processes (Schulze, Gryl & Kanwischer, 2013).

As a result, it is seen that geo-media is everywhere and people are interested in geo-media in some way. Geo-media is needed in travelling or reaching to a geographical location in any space (Lindner-Fally & et al., 2012). In terms of education, geo-media provides interdisciplinary learning and interacts learning subjects with each other (Lindner-Fally, n.d.). Considering this, it is thought that geo-media can play a role in comprehending different skills and achievements in social studies class. Thus, geo-media can even be used in various pedagogical approaches such as model, problem inquiry, project and game based learning (Gryl & et al, 2014). The use of geo-media is crucial in terms of geographical visualisation in schools and training pre-service teachers (Schulze, Gryl & Kanwischer, 2015). Moreover, beside the skills as language, mathematics, science; realising the environment is another skill that should be gained (Lindner-Fally & Zwartjes, 2012). Because people need spatial thinking to regulate their lives (Baloğlu Uğurlu & Aladağ, 2015). In this context, In the European Union the projects, which geo-media products were emphasized on, were supported. It is tried to make students gain different skills and competencies with projects such as digital-earth and SPACIT (spatial citizenship) with geo-media products.

The authentic learning approach integrated with Bilge Seyyah is a learning model that focuses on real world, complex world problems and their solutions in learning environments designed according to multidisciplinary approaches. In this model, the teaching environments are based on the real world, not the teaching purpose (Educause, 2007). With authentic learning, students solve problems and build real-world experiences. Thus, students become active learners (Newmann, Marks & Gamoran, 1996). In other words, authentic learning is a student-structured high-level learning that provides detailed information to solve the problems created in the real life context (Glatthorn, 1999). For the creation of authentic learning, learners focus on creative and realistic tasks that are complex and collaborative. It is seen that the most persistent learner in undergraduate education is so strong that the learners are getting stronger because they are making more efforts than the standard lecture methods and the teachers are also using better sources for authentic learning and are more diligent (Herrington, Reeves & Oliver, 2010). Authentic learning offers opportunities for continued learning and allows learners to discover real world practices in their new learning (Ryman, Burrell, Hardham, Richardson & Ross, 2009). Students also have the opportunity to explore, discuss and create meaningful concepts with authentic learning (as cited in New Zealand Ministry of Education, 2008; Fox, 2011; Doyle, 2011; Wang, 2012; Christmas, 2014).

Authentic learning applies relevant knowledge, thinking skills and interpersonal skills to solve real problems. Therefore, it consists the activities of researcher and generating creative products. Thus, teenagers think, feel and gain professional experiences in transferring products and services. These experiences are regarded as a tool for students to apply in their fields of study or in their own choice of information, thinking skills and creative thinking in interpreting their chosen problems (Renzulli,

1997). However, it is expressed that the practices of authentic students in the real world went back twenty years ago, (Rule, 2006) that is, its past is not too much (Koçyiğit, 2011). Nowadays, when the definitions about authentic learning are examined, it is seen that there is apprenticeship education at the basis of authentic learning, and that this process is closely related to the real world. (Bektaş & Horzum, 2014). In this context, it can be said that authentic learning is a new understanding. However, authentic learning is not a new strategy in education. Thus, it is known that it was a model used by craftsmen for raising apprentices in the past, and even craft associations made teaching practices with the group (Bektaş & Horzum, 2014). This has increased the number of studies related to authentic learning (Schaffer & Resnick, 1999).

## **Methodology**

### **Research Design**

In this research, it was aimed to find out whether the Bilge Seyyah made difference in the social study lessons of 6<sup>th</sup> graders (authentic learning approach supported by geo-media); in terms of their academic achievements, attitudes towards the lesson and permanent learning or not. In the study, experimental method was used to collect quantitative data from the sampling. In experimental studies where precise conclusions are drawn between scientific methods, researchers apply comparable operations and examine their effects so that experimental investigations are expected to lead the investigator to the most accurate interpretations (Büyüköztürk & et al., 2013). Experimental researches are carried out in a systematic manner under controlled conditions to see the degree of influence of a particular intervention in the solution of a particular problem. The researcher tries to determine what influences the variable he observes by carrying out his studies in artificial environments, and how he influences and under what conditions he changes (Özmen, 2014). However, since it is not a matter of students to be assigned to experiment and control groups, it is necessary to decide by randomly choosing experiment and control groups from pre-formed groups. This method under discussion is often used by educational researchers and is called a quasi-experimental model (Özmen, 2014). For this reason, a quasi-experimental model was employed to obtain quantitative data in the study (Büyüköztürk & et al., 2013).

### **Research Purpose**

In this study, it was aimed to determine whether the application called "Bilge Seyyah" in the social studies course had a meaningful difference in affecting the students' academic achievement and attitudes towards the course and providing the permanence of the information in the students. In this context, these following research questions were asked:

Sub-problems:

1. What is the effect of Bilge Seyyah on the academic achievements of students?
2. What is the effect of Bilge Seyyah on the permanence of students' learning?
3. What is the effect of Bilge Seyyah on students' attitudes towards social studies lesson?

### Study Group

The sampling of this research consisted of 6<sup>th</sup> graders. In order to determine the study group, each sampling unit was given equal opportunity, and simple unselected sampling, the method by which the selected units were sampled, was performed in two stages. For this sampling, the arbitrary sampling method, which can minimize the effect of external factors, was preferred. In this context, two secondary schools, which the application was going to be applied in, were determined at first through the arbitrary sampling method at first. Then, experimental and control groups were determined in these schools. The experimental group consisted of 41 students (n=41), the control group 43 students (n=43).

### Data Collection Tool

**Bilge Seyyah pilot study.** Before the practise, the usability of the Bilge Seyyah was tested with another practice. In this context, a checklist was constituted. With two experts Bilge Seyyah was applied on 7 students (n=7).

Checklists are referred to as lists of performance criteria for evaluating achievement levels in assignments (Başol, 2015). In this context, a checklist of 25 items containing all the functions, that Bilge Seyyah should be used by students, was created. Checklist is designed as a triple likert type scale with "Yes", "No" and "Partially" options and the opinion section also included that note of the different variables in the check list could be taken.

**Turks on the Silk Road unit academic achievement test (TSRUAT).** As a data collection tool for the measurement of permanent learning, the Turks on the Silk Road Academic Achievement Test (TSRUAT), which was prepared as multiple choice with four items and for the research within the frame of the predicted functions for "Turks on the Silk Road" unit- stated in the social studies curriculum of secondary school 6<sup>th</sup> class, was applied as pre-and post- test measurements for academic achievement.

The literature including social studies course books, workbooks and relevant scientific literature were reviewed during the preparation of the TSRUAT. Taking the content validity into account, a draft TSRUAT form of 54 questions, which was considered to be very easy, easy, moderate, difficult and very difficult, and items that were able to test the predicted functions, was formed. The questions were determined according to the steps in the cognitive domain classification of Bloom Taxonomy. The questions on the draft form were shared with the different experts studying on the fields of General Turkish History, Geography, Children's Literature, Turkish Literature and Social Studies, and some changes, subtractions and additions were made in draft form considering the opinions of these experts. Thus, the question number of the draft TSRUAT reached to 35.

In order to determine the reliability of the tests, a pilot application of the draft TSRUAT was conducted with 148 students, who studied on the Turks on the Silk Road unit. Gathered data were coded dichotomously in Microsoft Excel program and the matrix of item scores was established. The items discrimination value was calculated by

the item difficulty analysis based on the group difference of the upper and lower 27% of the matrix (Table 1.).

Table 1  
*The Study of Draft TSRUAT Reliability and Validity*

Questions	P <sub>j</sub> IDifI	R <sub>jx</sub> IDiscI	Q12	0,64	0,37	Q25	0,26	0,42
Q1	0,68	0,50	Q13	0,64	0,29	Q26	0,43	0,32
Q2	0,44	0,52	Q14	0,51	0,42	Q27	0,37	0,20
Q3	0,90	0,2	Q15	0,60	0,45	Q28	0,36	0,27
Q4	0,66	0,32	Q16	0,56	0,57	Q29	0,33	0,22
Q5	0,66	0,42	Q17	0,02	00	Q30	0,42	0,35
Q6	0,75	0,55	Q18	0,57	0,70	Q31	0,40	0,05
Q7	0,66	0,57	Q19	0,58	0,52	Q32	0,48	0,72
Q8	0,84	0,22	Q20	0,42	0,45	Q33	0,46	0,57
Q9	0,25	0,10	Q21	0,56	0,27	Q34	0,56	0,57
Q10	0,73	0,40	Q22	0,51	0,47	Q35	0,41	0,42
Q11	0,73	0,55	Q23	0,45	0,20			
			Q24	0,41	0,42			

The draft TSRUAT consisting of 35 items was prepared as a test after the reliability practice. The items stated between (P<sub>j</sub>) 0.39 – 0.16 and 0.15 - 0.00 in terms of item difficulty index were omitted, only the item coded as Q25 (P<sub>j</sub>=.26) was not omitted from the form. As the items, having the item difficulty index between 0.16 – 0.39 could be used when they were related to a significant topic or when it was not possible to make them easier, could be applied to increase student motivation (Başol, 2015). Q25 coded item was not omitted from the form. In addition, it is seen that (P<sub>j</sub>=.26) is within the scope of the applicable values in some studies (as cited in Dirlikli, 2015). The items having the scores of item discrimination index of questions in draft TSRUAT between (R<sub>jx</sub>) 0.20 – 0.29 and 0.19 – 0.00 were also omitted from the draft form (Başol, 2015).

As a result of the reliability tests related to the practice of the draft TSRUAT, the Cronbach's Alpha internal consistency factor was calculated as 0.782. As the Cronbach's Alpha internal consistency coefficient and Kuder-Richardson's value were the same when the items were measured in two quantities (Bademci, 2011), KR-20 value was not calculated. However, as it is thought that the item difficulty indexes demonstrated differences (Başol, 2015) the KR-21 value of the final TSRUAT was calculated and was found as 0.762. In addition, the standard deviation of the final TSRUAT was calculated as 4.808.

Cronbach's alpha internal consistency coefficient the final TSRUAT was calculated as 0.803 through the measurements applied to experimental and control groups. The fact that Cronbach's alpha internal consistency coefficient was above the acceptable value (Kılıç, 2016) indicated that the final TSRUAT was reliable and feasible. The developed TSRUAT was applied to the experimental and control groups as the pre-test before the experimental practice and post-test after the experimental practice. After 7 months of application of the post-test the TSRUAT was applied for the experimental and control groups as retention test. For the pre-test, post-test and retention tests, single course hour



was admitted to be adequate for the students. A pilot study was carried out before the application was determined to be effective.

**The attitude scale towards social studies lesson (ASSSL).** In order to determine attitudes of the students in experimental and control groups towards social studies, the attitude scale prepared by Demir and Akengin (2010) was applied before and after the practice.

The ASSSL consists of 26 items. Fifteen (15) of the items represent negative attitude sentences, eleven (11) of them positive attitude sentences. The attitude scale to be used is the five-point Likert type. In addition, the ASSSL measures 5 dimensions. The Cronbach Alpha internal consistency coefficient for all dimensions of ASSSL was measured as 0.932. Demir and Akengin referred that the ASSSL can be applied to determine the attitudes of the 6<sup>th</sup> and 7<sup>th</sup> class students in secondary school towards social studies lesson (Demir & Akengin, 2010). For this study, Cronbach's alpha internal consistency coefficient for all dimensions of the ASSSL was recalculated from measurements carried on experimental and control groups, and was calculated as 0.95.

**Personal information form (PIF).** *The Personal Information Form* consisting of four (4) questions was used to collect personal information belonged to the students participated in the research. In the form, in addition to the personal information of the students, the case whether they had personal computers and internet or not, was also investigated.

## Material

Instructional design is organised as learning environments where learning conditions are analysed and according to these analyses, students are satisfied (Akkoyunlu, Altun & Soylu Yılmaz, 2008). The Bilge Seyyah, which was created considering this context, was developed appropriate to the ADDIE model among the basic instructional design models. The ADDIE instructional design is a model that deals with instructional design as a comprehensive process which is influenced by constructivist approach. ADDIE model is the abbreviation of the English forms of the first letters of the concepts; analysis, design, development, implementation and evaluation. Since the ADDIE instructional design model is a basic model for all types of instruction and includes components of other instructional design models, it is more preferred compared with similar instructional design models (Arkün, 2007). This model mostly focuses on the stages of process rather than how can the instructional design be carried out. The instructional design suitable for the ADDIE model is conducted in five basic steps (Şimşek, 2013):

**First stage: Analysis.** In this step, the educational needs of the target group are determined in teaching environments, detailed analysis of student qualifications are made in detail; in addition, the support or obstacle cases of the institutional policies and conditions are identified. Thus, the educational objectives are determined according to priorities established according to certain criteria or techniques (Şimşek, 2013). In short, what is going to be learned is identified in this process. This step constitutes the base of the other steps.

The analysis process is considered as a stage where need analysis is done. In this context, the researcher does the need analysis. The instructional design is analysed in this process and thus, the problem situation is identified. Finally, the origin of problem is described. At the same time, limitations are determined and solutions related to the problem are tried to find out (Akkoyunlu, Altun & Soylu Yılmaz, 2008). Need analysis is also used to identify and remedy deficiencies in student performance (Morrison, Ross, Kemp & Kalman, 2011). For this reason, the first phase of the study was formed within the scope of need analysis. The Ministry of Education curriculum and coursebooks were examined for need analysis. It is intended that the planned instructional design should be a geo-media application and organized according to the authentic learning model. Therefore, it was noted that the entire unit should be entirely mappable and that tasks can be created in the context of the real world. In this scope, the unit Turks on the Silk Road was preferred.

The unit Turks on the Silk Road includes the emergence of the Turks on the stage of history, their initial states, their migration routes and their relations with other nations in 1000 years period. The birth of Islam and the development of the Islamic States established by the influence of Islam and the Turkish-Islamic States established by the Turks are among the topics included in the unit. From past till now, the capabilities and importance of the Turkish Army, the importance given to Turkish history by Atatürk, the activities of the Turkish Cooperation and Coordination Agency to preserve our cultural heritage and important item of Turkish culture are included in the unit. The unit is under the learning theme of Culture and Heritage (İneç & Akpınar, 2017).

The unit Turks on the Silk Road states in the secondary school sixth class curriculum. So, the target group of instructional design is sixth grade students. However, the Bilge Seyyah was designed suitable for each age and each group and can be changed. According to the need analysis, the data related to the strategies, situation analyses and participants were planned at this stage. As the participants were secondary school sixth graders, the size of the sample and the timing of the instructional design were planned in terms of time. These data obtained through need analysis were reviewed, priorities were determined and a report was prepared. At this stage, students' cognitive development levels, authentic learning criteria and components were determined and in the design and development parts of the teaching material are used together with the content of the report.

**Second stage: Design.** The draft design of Bilge Seyyah was made in the direction of the data obtained in the analysis process. The cognitive levels of sixth grade students in secondary school were taken into account by considering important cognitive development theories and a draft graphical interface was worked on. When creating a draft graphic interface, attention was paid to the web-based mapping service, navigation, multimedia files, time machine and progress bar specific areas. In addition, concepts, hints and information packs were integrated into the draft graphical interface within the framework of the authentic learning approach (Figure 1).

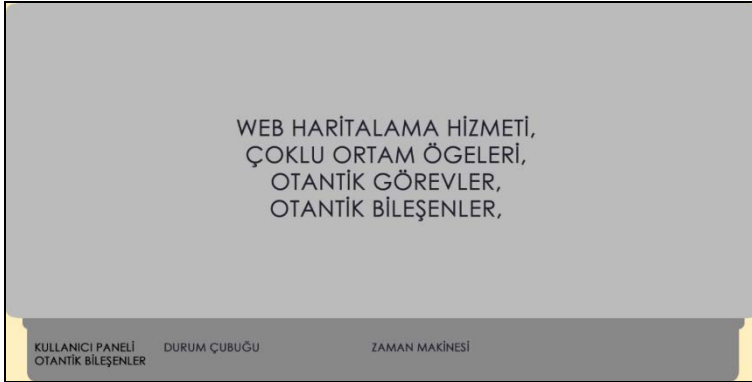


Figure 1. Draft Graphic Interface

After the components were located in the draft graphical interface, the graphical interface studies were started in Adobe CS6. When performing graphical interface studies, selecting colors suitable for the unit were taken care of. Due to the fact that the unit was covered by a historical period of 1000 years, the mat yellow tones and transitions were determined as background colour. Some visuals related to the coursebook of social studies prepared by the Ministry of Education were rendered transparent with graphic effects and placed on this color by changing formal attributes. The final graphic was optimised and minimised in size. Thus, background image of Bilge Seyyah was created (Figure 2). The background image of CSS3 (Cascade Style Sheet v.3) and HTML5 (HyperText Markup Language v.5) are resized for the users applied to the system with their codes in different pixel densities and shown as fullscreen.



Figure 2. The Background Image of the Geo-Media Application

Panels, components and functions were created on the background image with HTML5 and CSS3 code. The edges of the DIV layers created with the HTML codes are transparentised by ovalizing with CSS3 codes, coloring with mat blue tones. Ovalised layers were prepared to be functionalised by dynamic programming languages. JavaScript (JS) was used to make the navigation panel open and close with one click according to student request. When the graph defined by JS is clicked, the closed navigation pane created with the DIV (an HTML tag) layer is laid out downwards (Figure 3, Figure 4). This graph moves up and down to attract the attention of the student. The movement was created with animate.css.



Figure 3. When the Navigation is Closed



Figure 4. When the Navigation is Open

**Navigation tool.** The functional areas in the DIV layer, called the navigation panel, were created in accordance with the draft graphic interface. Another web page was created for this. This web page is called with an `<iframe>` (an HTML tag) from within the DIV layer and it executes functions such as querying and calling by connecting directly to the database. Functions such as user information, correspondence, cooperation and progress are displayed via this panel. There is also a time machine on the navigation panel showing the historical events took place in different regions of the world. There is an icon in the user's panel to enable the students to follow their friends' tasks and collaboration status. When this icon is clicked, all the students who are included in the system named as Dede Korkut's students are displayed (Figure 5).



Figure 5. Tasks & Collaboration Window

Displayed students are drawn from the database and the tables created with HTML tags are colored with CSS3. When the student clicks on any friend, the task steps of the student are displayed in a dynamic structure (Figure 6).



Figure 6. Task Steps (Tasks & Collaboration)

The area showing the task stages are directly associated with the database, created with HTML code and colored with CSS3 code. These operations prevent the user from taking extra data. Therefore, when the bandwidth provided by Ministry of Education to schools is considered, it also makes it easier for students to access the page. The colored tables form a virtual physical boundary between the tasks to be clicked. When these

tasks are clicked, the warning like the student's task or "Your friend has not completed the task!" comes on the screen (Figure 7).



Figure 7. Tasks Shown to Other Students & Collaboration Windows

There is a concepts icon just under the tasks & collaboration icon in the navigation panel. This icon directs the student to the page in which the concepts that may be encountered in the unit or his researches are included. In this page, concepts are shifted downwards with JS codes. The shift of the writing is blocked by the JS codes. In the navigation pane, there is also an exit icon under the user panel. Students click on this icon and they can safely exit from the system.

Tasks & collaboration, concepts, exit icon locate in the user panel. These icons are aligned down. A message "Hi + student name" at the right of these icons, welcomes the students who enter the system. Bilge Seyyah is also an imaginary Turkish-ancestor character who gives the name of the system and directs the students on the system. Letters sent by Dede Korkut to the students are available here (Figure 8). Dede Korkut is an imaginary Turkish character who transcribes the clues of the story with the videos (İneç & Akpınar, 2017).



Figure 8. User Panel

Just below it, there is a search box. The search box is shaped with CSS3 and added visualization to this box with image type. This field can be used to search the database through the Google Speech API (Application Programming Interface). On the right side of the user panel, there is the JQuery UI (a set of JS curators) Progressbar that shows the progress of the student. With some modifications, this was included to the database.



Thus, the system provides a level of progress relative to student activities. The progress bar is in motion and has a dynamic structure and content. The progress bar, with no graphical content in it, was created with all the visualization codes. (Figure 9).

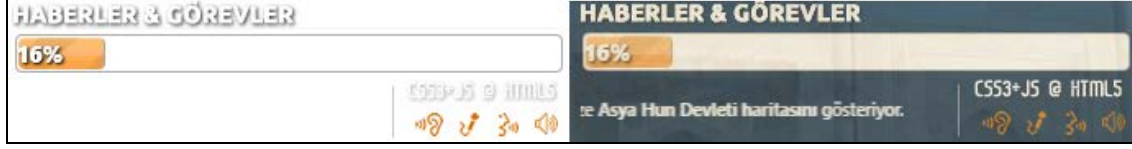


Figure 9. Progress Bar

At the far right of the navigation panel there is a time machine. The time machine was designed with Adobe Fireworks CS6, and became dynamic with JS code. The time machine is a dynamic structure that displays three different continents point and line according to different dates. Spot events demonstrated with stars, ongoing events are shown in solid, transparent and thick vector lines. In the same continent, events corresponding to the same turn are shown in different colors. When the mouse is hovered over these icons, the events that occurred in the small layers coded with CSS and JS by Bilge Seyyah are shown. With the time machine, the student can see which date s/he goes and what topic he / she is working on (Figure 10).

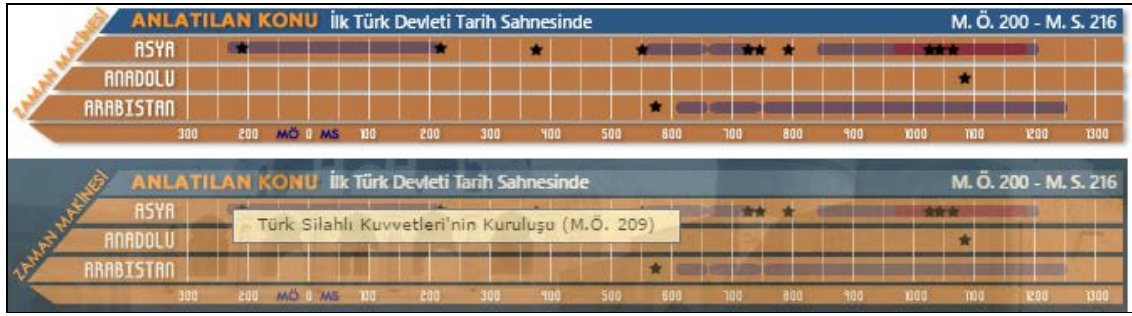


Figure 10. Time Machine

Navigation panel is protected by a security component and eject the user from the system if no transaction is performed for a certain period of time. All graphics for this security component were built with Adobe Fireworks CS6. The part that requires student information was created with HTML and CSS3 coding (Figure 11).

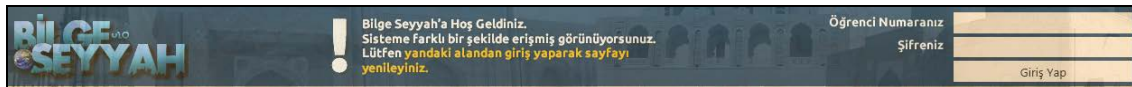


Figure 11. Security Component

**Web mapping & authentic components.** The part is where web mapping services and authentic components are located. Part DIV was created with layers and visuality (effects such as shading, rounding, and transparency) was enhanced with CSS3 code. The Google Maps JavaScript API (GMJSAPI) code is located between the DIV layer tags. Almost all of these codes were changed and made unique to Bilge Seyyah. As the codes were retouched, the decision mechanism on the API became a database. That is, what type of map will be shown, what kind of markers will be on the map, the database decides the content of the information windows. Beyond this, which states or states are to be shown, the database determines and draws maps by determining the

coordinates. In addition, the database decides authentic content, tips, and information documents described through the API. Essentially, the database manages the system in a semantic structure.

GMJSAPI maps according to the stage in which the student is in, overlays the vector graphics on the map or forms the route. Bilge Seyyah performs these operations in the x and y coordinate plane. After the Bilge Seyyah decides which map to display, it decides on the relevant images that direct the student, attract the attention of the student, and put them on the map. Most of these images were obtained by processing the images obtained from the Ministry of Education sixth grade social studies coursebook. Bilge Seyyah here combines the map and the corresponding visual to form a combination (Figure 12).



Figure 12. System-Determined Map and Overlaid Visual

Bilge Seyyah, with its semantic structure, can decide everything about the authentic learning of the student. For this, it is first clicked on the images that are reshaped and animated with effects (Figure 13).



Figure 13. A Section from Authentic Components

The contents of the information windows are created in accordance with the decisions of Bilge Seyyah. Pre-designed graphics have different scenarios for each task. The student visualizes the task given to Bilge Seyyah himself by the go to task button in the graph which is designed as orange. Immediately to the left of the task area, there is a place including clues to guide students in the videos of Dede Korkut. On the right of the task area, there is an area of sources. The student uses the geographic data and document package to complete the tasks. The areas of tasks, clues and resources are described in detail below.

**Tasks.** Bilge Seyyah decides the contents of the information windows itself and determines the task scenarios itself. In other words, the system determines what kind of tasks the student will perform. Thus, when the student clicks on the go to task button, Bilge Seyyah waits for him to perform his duty in the relevant task window.

Tasks are designed considering the gains determined for the unit. In the process of fulfilling the tasks, the student is in the center and the teacher is the guide. It is not possible to perform the tasks without searching. Some duties' topics are daily experiences in historical periods. The students undertake the role of the people in their past and the Turkish ancestors in these duties. In these duties, the events occurred in history can be repeated. Students also search for hidden historical objects and information in their duties. Scenarios created to do tasks are usually as; Bilge Seyyah's concern about the relevant period, returning with the time machine and returning to the student and asking for help. Written activities for sending the information obtained from the entire mission to Bilge Seyyah are included.



Some of the images related to the tasks were obtained from the 6th grade coursebooks of the Ministry of Education and from Google Earth. The images are prepared to be coded in Adobe Dreamworks CS6, after being passed through many processes with the Adobe Fireworks CS6 program. The task windows are completely linked to the database and store student information and activities in the database. Thus students can be followed through the system.

Most of the tasks are designed to be suitable for the student's learning by living. Tasks have a dynamic content generated by HTML5, CSS3, JS, Active Server Pages (ASP) languages. For example; the student, who opens his second task, is confronted with a 3D map covering Asia, Europe and North Africa. In the Turkestan region, Turkish tribes ride their horses. To the north of the Black Sea, there are other non-Turkish tribes. The purpose in this task is to investigate the reasons for the Turks to migrate to the different parts of the world from the Turkestan region and revive the Migration of Tribes. For this purpose, the student migrates the Turks to the north of the Black Sea from the Turkestan region and brings them against the other tribes there. Other tribes escape from the Turks and move towards Europe. Thus, students move the tribes in the north of the Black Sea to Europe. In the sixth task designed in line with the achievements related to the Silk Road, the student is a merchant, who starts a journey from Ötüken. In front of this merchant there is a route extending to Istanbul. Before the merchant starts his journey, he needs to load some valuable goods of the East on his caravan. The student travels around the Turkestan geography with the Turkish merchant and discharge his burden eventually arriving in Istanbul. The student is gathering information about events that s/he has through this process. These web-based activities were created with HTML, CSS3 and JS codes. Thus, instead of looking at a static image, students learn by doing and living on maps with dynamic content.

Some of the tasks are based on discovering hidden objects. For example, in the third task, the student finds Orkhun Inscriptions and begins his/her mission. HTML5, CSS3 and JS codes are used in this task again. At first sight the student only sees an empty map including the Great Wall. When the cursor is overlaid on the map, it leads the student by turning into different shapes. Thus, the student is uncovering the Orkhon Inscriptions from the ground and reading them. The inscriptions were placed on the map according to the current position. Thus, the discovery of the Turkestan Geography and the Turkish Nation are provided. After completing the task, student examines the information packages by taking advantage of the clues from Dede Korkut. Virtual tours were added to the task enabling the student to discover. For example, in the thirteenth task, all Turkish and Islamic Geographies can be visited by students in 3D.

**Clues.** Authentic tasks are one of the characteristic documents of authentic learning (Mims, 2003). In this context, it is necessary for the student to research and inquire so that he can complete his authentic tasks on the Bilge Seyyah. To make it easier, authentic clues were created on the Bilge Seyyah. Authentic clues were created connected with the real world. It was planned the clues should be given by a Turkish ancestor as the Turks on the Silk Road unit was related to the Turkish history. As the fact that Dede Korkut had a significant place in the Turkish history, the clues were given through Dede Korkut. In order to achieve this, opinions were taken from Turkish

Literature and Turkish History experts; in addition, TRT's 12-part "Dede Korkut Stories" production was examined. Thirteen clues texts were prepared narrated in the direction of achievements and skills investigated in detail in the unit, and Dede Korkut was shown to a Turkish literature expert who carried out related scientific studies. Then, an academicians conducting academic studies on children's literature simplified the sentences.

The prepared Dede Korkut clothes were put on a teacher who was under doctoral education on social studies education. The costume of the person in the role of Dede Korkut was prepared appropriate to the period, old-fashioned cane, used as the lair of Dede Korkut. The passage, which would be read by Dede Korkut was transferred to the computer and placed so that the tablet was out of the camera area. The video images of the Dede Korkut figure, who reads the passages from tablet, were recorded. The vids were arranged and antiquated. Coloured attachments and short musics were added at the end of the videos. Chosen music was cared to reflect the Turkestan geography. In this scope, At the end of the videos, the dombra played parts by Ulytau Kazakh music group played in Ak Jelen song (0:45 sec and after) were used. Although hosting the thirteen tips videos were planned to be hosted as the hosting service of <http://www.cbsuygulama.com>, YouTube was preferred because the streaming feature was expensive. Videos were integrated into Bilge Seyyah using YouTube API (YTAPI). YTAPI's JS codes were improved and task windows were opened in front of the student at the end of the video. In addition, YTAPI was linked to Bilge Seyyah's database to determine which video to show, was left to the semantic structure of the Bilge Seyyah. Thus, Bilge Seyyah can make videos with authentic tasks and matching the components according to the student's situation, (Figure 14).

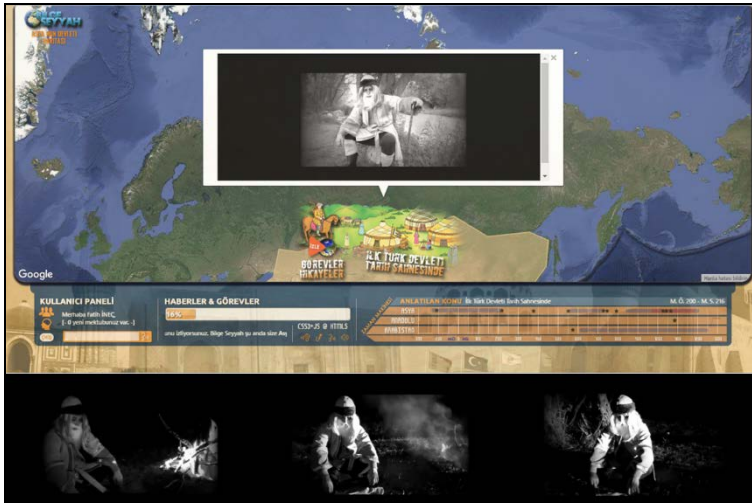


Figure 14. Authentic Video That the Bilge Seyyah Decided To Show

**Resources.** Students use the knowledge gained through research and inquiry in real life contexts to perform their authentic tasks. Therefore, information that students can access in a web-based environment must be current and reliable. In this context, some resource libraries were created so that students could conduct research and inquiries in a safe environment. These libraries were formed as a geographic data and document

information package. Geographical data package was created with TourBuilder (Beta version) under the framework of Chrome Experiments and was called as Bilge Seyyah Turkish and Islamic History Tour (BSTIHT). Satellite images were presented to the students in motion via BSTIHT. The system shows the world as a whole at first. Then, the previously determined locations were zoomed in and then moved away. The system enables the Turkestan and Islamic geography to be visualised as a whole on the Earth. The locations stated on the BSTIHT included twenty four different locations in the social studies coursebook to help students understand the Turkestan and Islamic geography well. It was aimed to establish the whole relation of parts with the routes on BSTIHT.

Locations are displayed in 2D on Google Chrome and in 3D with Google Earth plug-in on Mozilla Firefox. Bilge Seyyah needs only Google Earth plug-in while running. BSTIHT presents 3D images with these plug-ins. Locations on BSTIHT were determined and transferred to the system. The most important difficulty in this regard is that some places and places are not stated in today's maps. Their determination was made through Russian sources. Since no other data can be found other than Tötü Canal is located in the Fergana Valley, the channel was detected via satellite. The Mongols destroyed the Balasagun city, so today only some ruins can be seen.

BSTIHT also provides visuals and information packages according to the location where the student is located. For example, we were not satisfied only with Satellite images of the locations of Orhun Inscriptions and Tsaidam Gokturk Museum. With the studies by Prof. Dr. Muharrem Ergin (Ergin, 2015), some images stated in virtual museums as Novosibirsk State University, The Ancient Art of Siberia (NSU, 2016) were also included. Students had the possibility of virtual touring. Thus, the ancestral heritage that the students could reach in the geographical region of Turkestan was enriched. Since there were not much data and visuals on Turkish origin internet resources, some Russian sources were utilised. Russians upload the academic studies stated in region to interactive media with the Novosibirsk State University (NSU, 2016) Multimedia Center. Thus, Russians created 3D virtual museums.

One of the main resources applied on the BSTIHT was Wikipedia. The location where the student monitorised is connected with the relevant data resource stated in Wikipedia. The data related to the "Tagar Culture" the student may wonder, are provided in this way. Thus, different horizons were opened to the students. With BSTIHT students are also offered 3D virtual trips. 3D virtual trips are as topographic trails, artifacts and city cruises.

BSTIHT is a geographic information systems product based on Google Maps and Earth. Therefore, 360° panoramic virtual trips can be performed with features such as Street View. Document information packs are information packs directed by the student and there are five digital libraries in the content. Their reliability was analysed by a technopedagogue, who is an expert in his field. Two expert pedagogists and two General Turkish History experts for their content relevance also reviewed five digital libraries, accepted to be reliable.

Determined digital libraries:

- Wikipedia (Turkish History, n.d.a)  
([https://tr.wikipedia.org/wiki/T%C3%BCrk\\_tarihi](https://tr.wikipedia.org/wiki/T%C3%BCrk_tarihi)),
- Turkish Knowledge (<http://www.turkcebilgi.com/arastir?q=t%C3%BCrk+tarihi>),
- Turkish History Association (Turkish History, n.d.b)  
(<http://www.ttk.gov.tr/index.php?Page=Sayfa&No=323>),
- Turkish History (Turkish History, n.d.c)  
([http://www.turktarihim.com/T%C3%BCrk\\_Tarihi\\_1\\_0.htm](http://www.turktarihim.com/T%C3%BCrk_Tarihi_1_0.htm)),
- YouTube (Great Turkish History - From Central Asia to Söğüt (Documentary) ):  
(<https://www.youtube.com/watch?v=OnI4Aw8xWW0>)

Digital libraries also include texts, images, videos and sound recordings. Some of these libraries also link to other sources. Thus, short and comprehensive access to all kinds of information can be provided.

**Login screen.** A login screen was designed enabling to access to Bilge Seyyah. The background of the page is the same as the Bilge Seyyah. The CSS3 codes, detecting the different resolutions and spread the floor image over the entire screen. The username and password areas were placed on the screen display with HTML tags. The format settings were made with CSS3 codes. The page was created with the animate.css, the Font with Awesome vectoral icons (Figure 15).



Figure 15. Bilge Seyyah Login Screen

The data entered by the student at the login screen is sent to the login.asp page after the login button is clicked. If the login.asp confirms the data it received on the database, it directs the student to the Bilge Seyyah. If the data sent does not match, the student is asked to login again. At the bottom of the home page, there are the “Bilge Seyyah Use Instructions” and “Google Chrome Download Manager” links.

**Logos.** Designed logos, has the name of the Bilge Seyyah. This logo is displayed when connected to the login screen and the web mapping service database. The name “Bilge Seyyah”, an Earth graph (Earth Graph, n.d.) and Dede Korkut figure locate in the logo. Dede Korkut figure was created with processing the images gathered during getting the authentic learning clues. On the upper left corner of the area where the Bilge Seyyah web mapping services are offered, there is a world map and a logo that acts like a map name and a heartbeat, which the Bilge Seyyah decided to display according to the stage (Figure 16).



Figure 16. Bilge Seyyah Map Logo and Displayed Map Description

**Third stage: Development.** Bilge Seyyah is adapted to the geo-media technology of the authentic learning approach. In this context, it can be said that the environment is a multi-dimensional mapping system supported by a learning approach and multimedia media. This structure of Bilge Seyyah is similar to the multi-media learning approach (Bektaş & Horzum, 2014) in which more than one medium is used for meaningful learning. The examples Lombardi gave for authentic learning applications (Educause, 2007) are also included. Bilge Seyyah is based on the seven principles of Cognitive Multimedia Design in terms of ensuring the permanence of academic knowledge. These principles are (Mayer, 2001; Perkmen, 2011);

1) Multimedia Principles (Videos, virtual technologies, dynamic images, maps, graphics and content are the multimedia objects of Bilge Seyyah.)

2) Spatial Proximity Principle (The multimedia objects of Bilge Seyyah are integrated with the functions and style codes.)

3) The Temporal Proximity Principle (Bilge Seyyah's multimedia content interacts integrally with the student as they are integrated.)

4) The Principle of Consistency (examined by experts in the field of Bilge Seyyah's content.)

5) The Perceptive Proximity Principle (Bilge Seyyah, based on the multimedia objects required by the geo-media. Different methods and techniques were adopted to support the constructivist approach to realise the authentic learning instead of direct expression. In fact, various approaches that had not been used in the current literature were used to achieve authentic learning (İneç & Akpınar, 2017).)

6) The Surplus / Necessity Principle (The Bilge Seyyah was tested with a pilot study before it was implemented. The Bilge Seyyah was interfered with all functions that were not working, hard to use or unnecessary.)

7) Individual Differences Principle (Bilge Seyyah uses different methods and techniques to perform authentic learning (İneç & Akpınar, 2017). Bilge Seyyah provides access to information so that the student can fulfill his / her duties first. Therefore, the system is for students without prior learning. In addition, in authentic learning, students individually produce and share products. It can develop its own products by examining other products.)

Bilge Seyyah has some advantages because of running on the internet. These advantages are ensuring active participation of learners and addressing different characteristics. In addition, other advantages are providing the necessary time, transportation and evaluation for the pupils, and bringing the formal education environment out of the walls (Kesten, 2014). Taking too much time to transmit large multimedia applications over the internet is a weakness of internet applications. However, with using media data stream with stream feature, it was managed to access to large media files even on slow connections. This leads to the possibility that multimedia files such as educational audio and video can be easily loaded on the internet and used in e-learning platforms (Gülbahar, 2012).

Web-based design models such as linear designed instruction for instructional design, teaching designed by branching, teaching designed as hyper context are foreseen in the literature (Gülbahar, 2012). Bilge Seyyah suits the student oriented design model among these models. This model is the most preferred model, in which the student can work by determining his / her own strategies in accordance with his or her own preferences, and more responsibilities given to the student (Gülbahar, 2012). However, student can direct the Bilge Seyyah with only his actions. The system has the ability of reasoning according to student actions and interferes with learning activities. While the student can perform learning activities as he wishes, the system keeps these activities in the database and decides on behalf of the student. This means that an internet environment has been created in which individual differences, alternative content and learning styles are taken into consideration (Çoklar, 2014). In addition, this structure of Bilge Seyyah is explained by semantic web (web 3.0) (Demirli & Kütük, 2010; Çoklar, 2014). As a result, it is seen that the system has more improvements compared to the designed model.

**Codings (HTML, HTML5, CSS3, JS, ASP).** After Bilge Seyyah's design, the application was produced with some codes and web-based programming languages. These languages were used for the integration of the functions, APIs, videos, data packages, database and authentic learning of the Bilge Seyyah, which was designed and modeled. Bilge Seyyah is generally based on HTML among the core internet technologies and its version is 5.0. HTML is not a programming language, but code that can be read by browsers to connect some objects (tables, videos, images, text, etc.) through tags. The browsers read scanners visualise the HTML codes after they are interpreted and show them to the users (Wikipedia, 2016). Therefore, the links of the objects that constituted the Bilge Seyyah were generally realised with HTML5 codes. The basic properties of the home page, the field (field) where the data can be entered, the text and logo path are created with HTML5 tags. The main page of Bilge Seyyah consists of the main tables and DIV layers. Tables and layers were created with HTML5 tags. Essentially, tables and layers can be thought as spines bearing the burden of web pages. Since HTML codes contain opening and closing tags, objects and functions are placed between these tags. The web mapping service function thus works with JS code placed between HTML tags. HTML and HTML5 codes are used to create the navigation panel and its content in the main page. However, the dynamic functions in the navigation panel can not be created with the HTML type language for now. The

graphics that are displayed in the navigation panel are called by using HTML-based coding. The same kind of coding was used in calling the graphics in the information windows. There are HTML codes on the basis of the text fields in the task windows and the dynamic activities that the student can perform on the map. The functions of HTML tags are more crucial in operations like holding, moving.

#### *Sample Code 1*

HTML code section from Bilge Seyyah

```
...
    </script>
</head>
<body ondragstart="return false" onselectstart="return false" oncontextmenu="return false;" onkeydown="return false">
<table width="100%" border="0" cellpadding="0" cellspacing="0">
  <tr>
    <td align="center">
...

```

When creating the backbone of Bilge Seyyah with HTML type encodings, the formal features are determined with CSS3. Simply, the visuals of the page are provided by the CSS code associated with the HTML code. The formal features of Bilge Seyyah are also adjusted with CSS3 in this direction. The text fields, formatted with CSS3 codes. Were designed with send button and directives in HTML3 type code that are located on the login screen with CSS3. The logo, text fields, submit button, and directives are all down to the top with predefined codes in the animate.css style file and descend after a certain time. The background of the login page can be done full screen with CSS3 codes. The vector icons used in the text areas are also shown with Font Awesome. HTML matching with CSS3 is done with class tag. On the main page of Bilge Seyyah, CSS3 codes were used extensively. While the page is being prepared, the Bilge Seyyah logo descends from top to bottom. The CSS3 definition, also called Loader, emphasizes the fact that the page is animated (Figure 17).



Figure 17. During The Creation of the Bilge Seyyah

The formal characteristics of the Bilge Seyyah's tables and DIV layers are determined by CSS3 codes. Transparency was ovalised to the edges with various CSS encodings. Tables and DIV layers with authentic components with navigation panel and web mapping service are made transparent with coder-like CSS. Thus, the floor and the bottom of the layers and the floor can be seen. The floor graphic of this page is full screen with CSS type coding. The vector icon showing the navigation panel is also animated with animate.css. After the navigation panel was opened, the textual properties of the screen that appears on the learning screen and of the JQuery UI Progressbar (JQUIPAPI) were determined by CSS3. JQUIPAPI appears to be an API from the web page. The dynamic content of the graphics of the time machine in the navigation panel



was created with CSS and JS codes. The formal properties of the dynamic information boxes that are displayed when the mouse is over are defined with CSS.

#### *Sample Code 2*

A sample CSS code from the Bilge Seyyah

```
...
#panel, #flip {
    padding: 5px;
    text-align: center;
    background:url(img/pan_zemin.jpg);
    width: 1264px;
    opacity: 0.65;
    filter: alpha(opacity=05);
    border: 0px solid;
    border-color: #333;
    height: 10px;
    border-radius: 0px 0px 8px 8px;}
...
```

Most of the functions of Bilge Seyyah are created with JS (JavaScript) which is a dynamic programming language. The "username" and the encrypted "password" that disappear when you click in the text fields on the home page are identified by JS. This identification is provided by a ready script. The functions of the transaction page of Bilge Seyyah are all realised with JS. In addition to the customization of the task windows, JS codes were written for functions such as dynamic operations in the task, returning, and automatic opening of task windows after the videos, automatic termination of the completed task, opening and closing of the navigation panel and dynamic operations in time. However, the greatest feature of the system with JS is undoubtedly the extreme changes that GMJSAPI and the code in it make over the whole. The web mapping service run with this API. The JS code in the API was changed so that authentic learning could be performed in the framework of the student's relative principle and the semantic construct could be executed. Marginal changes were made in JQUIPAPI and YTAPI in order to realise the desired functions in JS codes. For example, by connecting to JQUIPAPI's database, it was provided that the system determines the progress of the student. It was also linked to the YTAPI database so that the system decided which YTAPI would show the clips. In order to detect the video end, the API was modified so that the corresponding task window was automatically opened. JS codes were replaced with ASP codes in some places and the database was accessed to the system. For this, the ASP programming language was linked to the database.

#### *Sample Code 3*

GMJSAPI code from Bilge Seyyah (modified)

```
...
var centerBSDIV = document.createElement('div');
var centerControl = new CenterControl(centerBSDIV, haritaMerkez);
centerBSDIV.index = 1;
map.controls[google.maps.ControlPosition.TOP_LEFT].push(centerBSDIV);
}
google.maps.event.addDomListener(window, 'load', initialize);
...
```



All functions of the web mapping service (273 point coordinates, effects, polygons, polylines, vector overlaps, activities to be done, dynamic content and complex operations = task database) were realised with simple operations such as ASP and Bilge Seyyah security operations and messaging. In addition, the general decision mechanism of Bilge Seyyah was established thanks to the connections with ASP coding. The database connection was provided with ADOdb. With the information stored in the database, the system decided instantaneously for the stage of the system, authentic video and authentic content, point marking status, icons, map names, map types and student - task mapping situations.

**Applied software.** Different software was used in creating Bilge Seyyah. These were;

- Graphic design: Adobe Fireworks CS6
- Codings and programming: Adobe Dreamweaver CC
- Video processing operations: WonderShare Video Editor, Movie Maker
- Sound editing: WavePad Sound Editor
- File transfer via FTP protocol: CuteFTP, FileZilla
- Scanner tests: Google Chrome, Chrome Canary, Mozilla Firefox, Edge, Opera
- Satellite images: Google Earth
- Database operations: Microsoft Access.

**Fourth Stage: Implementation.** At this stage, possible variables that affect the implementation of wise traveler are emphasized (Şimşek, 2014). In addition, instructional design is fully implemented effectively (Akkoyunlu, Altun & Soyulu Yılmaz, 2008). In this context, a pilot study was conducted in a secondary school where the first researcher and independent expert students belonging to different socio-economic groups were learned from MEB officials in order to determine the possible variables that could affect the teaching material. The practice was carried out with the participation of volunteer students. Bilge Seyyah was introduced to the students and all the features of the system were shown.

It was observed from the data gathered via the Check List that students had difficulty in in operations as: “the skill of changing videos’ image qualities ( $f=2$ )”, “displaying concept lists ( $f=1$ )”, “display geographic data packages ( $f=1$ )”, “use the concepts button ( $f=1$ )”. Some improvements were made in the system considering the opinions of the experts. In this context, the icon of the list of concepts was enlarged; a list of concepts and other functions were defined with a sub-tag in the HTML code. After opening the list of concepts, the marquee tag was associated with the mouse pointer JS code and made it more functional. Geographic data package and graphics containing data packets were redesigned, some graphical effects related to the physical separation of tasks hints were provided. After the changes, the practice was again tested at the same school, but with two experts to different students. This time, no problem was encountered. The application is limited to the duration of the course for the Turks on the Silk Road unit. The application was finished in the estimated time. The interest of school managers to the application was also considerable.

**Fifth stage: Evaluation.** At this stage, the adequacy and effectiveness of Bilge Seyyah are measured. The evaluation order is related to the first four steps of the

ADDIE design model and is a process in which learners are investigated and tested (Akkoyunlu, Altun & Soylu Yılmaz, 2008). During the research period, 24 lesson hours were allocated to the experimental and control groups for the “Turks in Silk Road” unit. This is estimated duration for the relevant unit. In the process, the course was taught with the Bilge Seyyah in the experimental group. The control group, however, had the lessons without being affected by this practice.

### Data Collection

The research was carried out in the fall term of the 2015 – 2016 educational year. At the very beginning of the practice process, the TSRUAT and ASSSL forms were applied for the experimental and control groups as the pre-test; at the end of the process, the TSRUAT and ASSSL were used as the post-test. The TSRUAT was used as the retention test to the experimental and control groups after seven weeks.

### Student Profiles

The test of whether the students in the experimental and control groups are similar to each other in the context of life standards is important in terms of the homogeneity of the groups. In this context, the data obtained with PIF distributed to experimental and control groups are indicated in Table 2.

Table 2  
*Student Profiles*

Characteristics	Dimensions	Exp. Group		Cont. Group	
		<i>f</i>	%	<i>f</i>	%
Gender	Female	20	48,8	21	48,8
	Male	21	51,2	22	52,2
Average Family Income	Lower than 1000 TL	8	19,5	11	25,6
	Between 1000 and 1500 TL	11	26,8	14	32,6
	Between 1500 and 2500 TL	17	41,5	9	20,9
	2500 TL and higher	5	12,2	9	20,9
Having a Computer	Yes	25	60,9	28	65,1
	No	16	39,1	15	34,9
Having Internet	Yes	15	36,5	18	41,9
	No	26	63,5	25	58,1

The data obtained with PIF were analysed by two way Chi-Square test. According to the result of two way Chi-Square test, it was found out that the family income cases [ $X_{2(1)} = 4,393$ ,  $p > 0,05$ ] between experimental and control groups; having a computer cases [ $X_{2(1)} = ,155$ ,  $p > 0,05$  ], and the having the internet-connected computers [ $X_{2(1)} = ,245$ ,  $p > 0,05$ ].

The results of the two way Chi-Square test showed that the experimental and control groups had similar proportions; therefore, it can be said that the students were homogeneously distributed to the experimental and control groups.

### Data Analysis

Data obtained from students with TSRUAT pre - test, post - test, permanence test and ASSSL used in the study were analysed in computer environment using SPSS program. In order to find the first sub - probing response, the data obtained as a result of

applying TSRUAT as pre-test and post-test participant were analysed. The distributions of the data are pre-tested; it was calculated that the skewness value as: ,188 and kurtosis value -,546; the skewness value for the end - test ,382 and kurtosis value as -,818. In order to find the second sub-problem response, the result obtained by applying TSRUAT as a participant retentivity test was also analysed. The distributions of the data used for permanence test were calculated as: skewness value, 211 and kurtosis value -,747. In order to find answer to the third sub - problem, the results obtained by applying ASSSL as a pre - test and post - test participant were analysed. The distributions of the data used for pre-testing were calculated as: skewness value -,680 and kurtosis value -,240, the skewness value for the post-test ,787 and kurtosis value -,141. Since these values varied between +2 and -2, the distribution was assumed to be normal (DeCarlo, 1997). Since there was no significant difference between achievement pre-tests of the experimental and control groups, the difference between the post - tests was analysed using the independent sample t-test. The findings gathered are presented in the tables.

Frequency and percentage values of the data obtained from TSRUAT were calculated, and then t-test was performed on independent groups. In addition, the data collected from the determination of the permanence of the students in their learning were analysed with SPSS 23 package program and the contribution of Bilge Seyyah was revealed. The attitudes of the students in the experimental and control groups towards the social studies course were determined with ASSSL and tested with SPSS 23 package program. The data obtained as a result of these operations are indicated with the generated tables.

## Findings

### The Findings Related To Sub-Problem: What Is The Effect of The Bilge Seyyah on The Academic Achievements of Students?

The first sub-problem in the research is the question: “what is the effect of the Bilge Seyyah on the academic achievements of students”. With this purpose, firstly t-test was conducted on independent groups to determine whether the difference between the TSRUAT pre-test and post-test scores of the students in the experimental and control groups was significant. The findings are indicated in the Table 3 and Table 4 in order.

Table 3

*Independent Group's t-test Results on TSRUAT Pre-Test Scores of Students in Experimental and Control Groups*

	N	$\bar{X}$	S	sd	t	p
<b>Experimental Group</b>	41	34,73	13,57	82	-,753	,454
<b>Control Group</b>	43	37,02	14,29			

As the Table 3 is examined, the average of the total score of the experimental group obtained from the TSRUAT pre-test of the test group is  $\bar{X} = 34.73$ , and the average of the total score of the control group of the TSRUAT pre-test is  $\bar{X} = 37.02$ . Although there is a difference between the averages, this difference is not statistically significant ( $t_{(82)}=-753$ ,  $p>,05$ ). Thus, it can be said that the groups are equal before the application.

Table 4

*Independent Group's t-test Results on TSRUAT Post-Test Scores of Students in Experimental and Control Groups*

	N	$\bar{X}$	S	sd	t	p
Experimental Group	41	58,19	21,92	82	2,257	,027
Control Group	43	48,27	18,25			

As the Table 4 is examined, the average of the total score of the experimental group obtained from the TSRUAT post-test is  $\bar{X} = 58.19$ , and the average of the total score of the control group obtained from the TSRUAT post-test is  $\bar{X} = 48.27$ . The difference between the averages is statistically significant ( $t_{(82)}=2,257$ ,  $p<,05$ ). From this result, it can be said that the achievement scores demonstrated a significant difference in favor of the experimental group. However, without calculating the magnitude of the independent t-test difference between the two means (Can, 2016), *Cohen's d-value* was calculated to

determine the effect size index of the differences. To achieve this, the  $d = t \times \sqrt{\frac{N_1 + N_2}{N_1 \times N_2}}$  formula (Can, 2016) was used and d index was found as 0,49. For the effect size index, d is assumed to be weak if it is less than 0.2, normal if it is 0.5, and strong if it is greater than 0,8 (Cohen, 1977; Cohen, 1992; Cohen, 2008; Green, Salkind, 2005; Büyüköztürk, Çokluk & Köklü, 2013). Therefore, it can be said that this value is close to the medium effect value.

These findings may suggest that the students of the experimental group using the Bilge Seyyah in the social studies class are more successful than the students of the control group excluded from this environment. In short, it can be said that the usage of the Bilge Seyyah applied to experimental group is more effective in increasing academic achievement.

#### The Findings Related To The Second Sub-Problem: What Is The Effect of The Bilge Seyyal on The Permanence of Students' Learning?

The second sub-problem determined in the study is the question: "what is the effect of the Bilge Seyyal on the permanence of students' learning?" With this purpose, t-test was conducted on independent groups to determine whether the difference between the TSRUAT retention total scores of the students in the experimental and control groups was significant. The gathered findings are indicated in Table 5, in order.

Table 5

*Independent Group's t-test Results on TSRUAT Permanence Test Scores of Students in Experiment and Control Groups*

	N	$\bar{X}$	S	sd	t	P
Experimental Group	41	55,12	20,58	82	2,041	,044
Control Group	43	46,28	19,11			

As the Table 5 is examined, the average of the total score of the test group in the TSRUAT permanence test  $\bar{X} = 55.12$ ; the average score of the total score of the control group in the TSRUAT permanence test is  $\bar{X} = 46.28$ . The difference between the average scores are statistically significant ( $t_{(82)}=2,041$ ,  $p<,05$ ). Considering this result, it can be said that the retention test achievement scores demonstrated a significant difference in favor of the experimental group. In addition, *Cohen d value* was calculated to determine the effect size of the differences and the value was found to be 0.44. It can be said that this value is close to the medium effect value.

These findings may mean that the students of the experimental group who use the Bilge Seyyah in the social studies lesson are more permanent to learn than the students of the control group, which are excluded from this environment. In other words, with Bilge Seyyah, the learning of the students becomes more permanent.

### **The Findings Related To The Third Sub-Problem: What Is The Effect of The Bilge Seyyah on Students' Attitudes Towards Social Studies?**

The third sub-problem determined in the research is as; "what is the effect of the Bilge Seyyah on students' attitudes towards social studies?" With this purpose, independent groups were t-tested to determine whether the difference between the ASSSL pre-test and post-test total scores of the students in the experimental and control groups were significant. The gathered findings are indicated in Table 6 and Table 7, in order.

Table 6

*Independent Group's t-test Results on ASSSL Pre-Test Scores of Students in Experimental and Control Groups*

	N	$\bar{X}$	S	Sd	T	p
<b>Experimental Group</b>	41	96,29	20,98	82	,990	,325
<b>Control Group</b>	43	91,58	22,57			

As the Table 6 is examined, the average of the total score of the experimental group in the ASSSL pre-test is  $\bar{X} = 96, 29$ ; the average score of the total score obtained by the control group on the ASSSL preliminary test is  $\bar{X} = 91, 58$ . Although there is a difference between the averages, this difference is not statistically significant ( $t_{(82)}=.990$ ,  $p>.05$ ). Considering this, it can be said that the groups are equal before the application.

Table 7

*Independent Group's t-test Results on ASSSL Post-Test Scores of Students in Experimental and Control Groups*

	N	$\bar{X}$	S	sd	T	p
<b>Experimental Group</b>	41	102,07	18,20	82	2,592	,011
<b>Control Group</b>	43	89,26	26,53			

As the Table 7 is examined, the average of the total score of the experiment group in the ASSSL post-test  $\bar{X} = 102, 07$ ; the average of the total score of the control group from the ASSSL post-test is  $\bar{X} = 89.26$ . The difference between the averages is statistically significant ( $t_{(82)}=2,592$ ,  $p<.05$ ). Considering this result it can be said that the retention test achievement scores demonstrated a significant difference in favor of the experimental group. In addition, *Cohen's d* value was calculated to determine the effect size of the differences and the value was found to be 0.56. It can be said that this value is close to the mean effect value.

These findings may suggest that the students of the experimental group using Bilge Seyyah have a more positive attitude toward the social studies course compared with the students of the control group excluded from this environment. In this context, it can be said that with Bilge Seyyah, the attitudes of the students towards the social studies course are affected in the individual direction.

## Conclusion and Recommendations

In this research, the creation process of a teaching material called the Bilge Seyyah and produced by geo-media technology was explained. With Bilge Seyyah, which has the ability to perform semantic structure and complex operations, students made virtual trips and reached the virtual fair and checked contents. While the students were performing the course activities in this system, they had the opportunity to see and interpret the past and present world much more differently from the coursebooks. With the semantic structure of Bilge Seyyah, the students easily established the relation of history - geography - location. They reached to the answers of their questions. “Where and at what time am I?”, “Where and when does this event take place?” in a chronological order, in a relational framework.

One of the major problems in social sciences, and especially in the field of history, is undoubtedly the inability to experiment, in other words, the inability to repeat the past events. It was tried to overcome this problem with the Bilge Seyyah. With the tasks given to the students by Bilge Seyyah, the students repeated the events that happened in the past with their own point of view. The student was transferred to the past, the historical places and the different geographies from when and where they are located.

With this research, authentic learning approach was integrated into geo-media technology for the first time. Thus, students are given an authentic learning environment in social studies classes. In this context, the student was presented with various subjects, histories and venues in the virtual environment. The Bilge Seyyah decided these semantic structures used in this study for the first time in geo-media technology. In addition, the control groups that were excluded from this environment, and the experimental group performing the learning activities with Bilge Seyyah increased their achievement levels after the events. However, it was found that the difference of the academic achievement score of the experimental group was more significant than the control group difference of the academic achievement score in the comparison between the groups. In short, it was seen that the Bilge Seyyah applied to experimental group was more effective in increasing academic achievement.

This result is similar to the results of some investigations in which academic achievement is investigated, applying similar environments and / or understandings to learning environments because of the lack of cooperative studies of geo-media technology and authentic learning approach.

Learning environments that are structured according to the authentic learning approach are determined to be effective in increasing academic achievement by Taraf, 2011; Koçyiğit, 2011; Maddox, 2012; Ogawa & Matsumoto, 2012; Koçyiğit & Zembat, 2013; Yalvaç Hastürk, 2013; Safuan & Soh, 2013; Hürsen, 2016. It was found in the studies conducted by Demircan, 2004; Ulusoy, 2012; Tekin, 2013; Öz, 2014, that authentic materials which supported learning environments increased the academic achievement of students. The learning activities carried out with authentic evaluations increase the academic achievement of the students is put forward by the researches Kim, 2003; Johnson, 2007; Karakuş, 2006; Karakuş, 2009; Bay & et al., 2010. In addition,

Williams, 1999 that authentic learning environments were also effective in enhancing academic achievement, determined it.

It was determined that the achievement levels of the students decrease as a result of the retention tests applied seven weeks after the activities in the experimental groups applied to the Bilge Seyyah's learning activities and the control groups excluded from this environment. However, it was found that the academic achievement score difference of the experimental group was higher than the control group difference of the academic achievement score in the comparison between the groups. In short, it was determined that the learning of the students was more permanent with the Bilge Seyyah applied to the experimental group.

This result, which has been determined in terms of the permanence of academic achievement, due to the fact that similar studies are not used together with geo-media and authentic learning approach, the results of the studies by Demircan, 2004, who designed the course with authentic materials and Karakuş, 2006, who supported his course with authentic evaluation activities demonstrated similarities.

The attitude levels towards the social studies emerged in favor of the experimental group between the experimental groups performing the learning activities with the Bilge Seyyah and the control groups which are excluded from this environment. In short, it was observed that the Bilge Seyyah applied to the experimental group was more effective in increasing the attitude towards social studies lesson.

This result, which was determined in terms of attitudes towards the course due to the lack of similar studies used in combination with the geo-media and authentic learning approach was similar with the results of the studies by Gürdoğan, 2014; Hamurcu, 2016; Horzum & Bektaş, 2012; Jones, Casper, Dermoudy, Osborn, Yates, 2010; Koçyiğit, 2011 who constructed lessons with authentic learning approach and thus determined students' attitudes towards the class. Boran, 1999; Cor, 2011; Güner, 2016; Kale, 2010; Öz, 2014; Taraf, 2011; Nişancı, 2013; Varmış Kılıç, 2011; Yaman, 2014 supported their lessons with authentic materials and got similar results with the results in this research. In addition, Azarmi, 2010 supported his lesson with authentic games, Fook & Sidhu, 2010 and Karakuş, 2006 conducted their lessons with authentic evaluation and determined that the attitudes of the students increased similar to the results in this research.

As much as we determined, studies in which different learning approaches are applied through new technologies are limited in the literature. Therefore, it is thought that this study will shed light on the teaching technologies and researchers working on material design. The integration of various learning methods, approaches and models in geo-media or similar applications in the teaching of social sciences is crucial. In this way, different structures can be built into the technologies. Similar new researches will contribute much to the literature and educational activities.

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